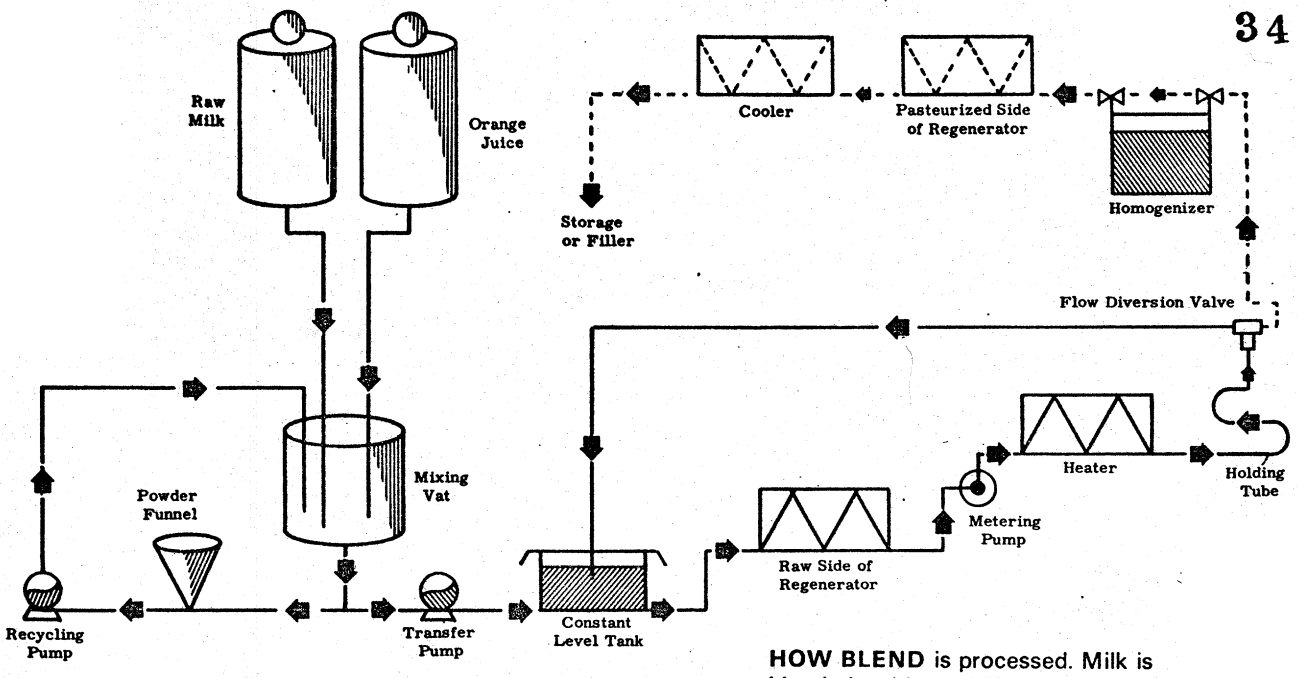

HOW BLEND is processed. Milk is blended with stabilizer, then orange-juice and sugar are added. After mixture is aged, it is pasteurized, homogenized and cooled.

Develops Milk-Orange Juice

With 38% juice and stabilized against curdling, refreshing beverage offers a desirable combination of nutrients

WIDE CONSUMER APPEAL is seen for a new, refreshing and nutritious beverage—a stabilized combination of milk and orange juice.

The product combines the highly desirable protein and mineral constituents of milk with the vitamins and other nutrients of orange juice. These constituents are retained in the combination and manufacturing process. Fortification with Vitamins A and D can be carried out with no effect on the drinking characteristics of the beverage. Its consumption should improve the diets of many persons who have been reported through surveys to be deficient in calcium and certain vitamins and amino acids.

Key points in development of this beverage:

Selection of ingredients in optimum proportion to get maximum palatability, and

Use of a stabilizer, carboxymethyl cellulose, to prevent protein precipitation at pH 4.7.

It is believed that curdling of the milk is prevented by a complex that is formed between the casein and the acidic carboxyl groups of the CMC molecule. This complexing, plus subsequent homogenization, prevents protein coagulation and separation at the iso-electric point of the casein.

The blend, which has a viscosity of less than 10 cps, was developed cooperatively by USDA's Agricultural Research Service and Dairy Development, Inc., Springfield, Pa. The latter has laboratory personnel stationed with the USDA group to do product research. Successful formulation of the blend indicates possibilities for development of a wide range of milk and fruit juice combinations with refreshing beverage characteristics.

D. R. SHENKENBERG, and J. C. CHANG, and L. F. EDMONDSON

Respectively, Director of Research and Dairy Technologist, Dairy Development, Inc., Springfield, Pa.; and Investigations Head, Dairy Products Laboratory, Eastern Marketing and Nutrition Research Div., Agricultural Research Service, USDA, Wash., D. C.

Acceptance tests show that the new product appeals to many segments of the population, including non-milk drinkers. Ninety percent of respondents from a sampling of over 5,000 people ranked the product at 4 or 5 on a 5-point hedonic scale.

Extensive panel testing, confirmed by consumer sampling, led the the following preferred product formulation:

Ingredient	% By Weight
Whole milk (3.25% BF)	56.8
Orange juice (11.8 Brix)	38.0
Sugar	5.0
Stabilizer (CMC)*	0.2
	100.0%

Add 1 fl. oz. of single strength orange oil per 100 gal (880 lb.)

***Medium viscosity, 0.7 Degree of Substitution**

Here is the recommended procedure for manufacturing the milk–orange juice beverage.

Equipment Needed

Raw milk storage tank, orange juice tank, mixing tank, funnel with recycling pump, HTST pasteurizer, homogenizer, finished product storage tank. (See flow diagram.)

Processing Conditions

Make up orange juice from concentrate to 11.8 Brix. Cool orange juice to less than 40F for later addition to milk. Add orange oil. Fresh orange juice can be used if available. It must be cooled to less than 40F before adding to milk.

Measure the required amount of milk into the mixing tank. Milk must be cooled to less than 40F prior to addition of stabilizer and sugar. Capacity of mixing tank must be sufficient to accommodate the entire amount of ingredients. All of the milk must be in the mixing tank prior to addition of stabilizer.

Start the agitator in the mixing tank and continue stirring during the entire manufacturing procedure.

Dry-mix the stabilizer with a portion of the sugar. Mix by weight at the rate of 1 part stabilizer to 10 parts sugar.

Start the recycling pump and add the stabilizer-sugar mixture through the funnel. The return line must be below the milk level in the mixing tank to reduce foaming. Add the stabilizer-sugar mixture as rapidly as possible to reduce foaming. Turn off the recycling pump as soon as all of the stabilizer-sugar mixture is incorporated. Special care must be taken to prevent stabilizer lumps from forming in the milk.

Age the milk-stabilizer mixture for at least 15 min at less than 40F.

Add the cold orange juice to the milk-stabilizer mixture. The orange juice should be added below the surface of the milk to minimize foaming.

Add the remainder of the sugar and age the mixture for a least 15 min at less than 40F.

Pasteurize in HTST unit at 170F.

Homogenize after the holding tube at 3000 psi (first stage) and 500 psi (2nd stage).

Cool to less than 40F and store for packaging.

The described product and the procedure for processing were developed for use in existing Grade A milk processing plants. The product has a shelf life equal to or better than regular homogenized milk of the same quality raw supply and processed in the same manner. It is expected that the milk-orange juice beverage will be distributed and sold in the same manner as Grade A milk products.

May Need Special Labeling

The unusual combination of two beverages in major quantity may result in unexpected labeling problems in some areas. Appropriate regulatory agencies should be consulted to assure that this product is properly labeled and that carton approval is obtained.

The manufactured cost of this beverage is not substantially different from that of Grade A homogenized milk. Obviously this comparison will be affected by varying costs of milk and orange juice. Certainly it can be processed and sold at a price that will return sufficient profit to the processor while providing good food value for the consumer dollar. (End)